

WHAT IS CLAIMED IS:

1. A signal transmission method for selecting streams from a plurality of streams, each composed of a signal packetized in compliance with the Moving Picture Experts Group (MPEG) Standard, and concatenating the streams into one single output stream and outputting the output stream, said signal transmission method comprising the steps of:

assuring synchronization in System Time Clocks (STC's) across a plurality in stream output means for outputting streams;

assuring the continuity of Program Clock Reference (PCR), Presentation Time Stamp (PTS), and Decoding Time Stamp (DTS) of the output stream when the streams are concatenated; and

controlling said stream output means so that any stream containing information is not transmitted at the switching of streams when the streams are concatenated.

2. A signal transmission method according to claim 1, wherein said stream output means causes the Program Specific Information (PSI) and the Program Clock Reference (PCR) to coincide with each other in timing and period and the transmission periods of the PSI and the PCR in the output stream are set to be a predetermined period.

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wherein any stream containing information is not transmitted at the switching of streams by controlling the stream output means so that the finish end of the Group of Pictures (GOP) is transmitted prior to the switching of the streams while the start end of a next GOP is transmitted subsequent to the switching of the streams.

4. A signal transmission method according to claim 3, wherein the continuity of the picture sequence, the Presentation Time Stamp (PTS) and the Decoding Time Stamp (DTS) in the output stream is assured in the output stream by synchronizing the Groups of Pictures (GOPs) prior to and subsequent to the stream switching across the stream output means.

5. A signal transmission method according to claim 3, wherein the stream output means is controlled so that a first Group of Pictures (GOP) subsequent to the stream switching becomes a closed GOP.

6. A signal transmission method according to claim 3,

wherein the stream output means is controlled so that the start end of a first Group of Pictures (GOP) subsequent to the stream switching becomes the start end of a Packetized Elementary Stream (PES) tagged with a Presentation Time Stamp (PTS).

7. A signal transmission method according to claim 2, wherein said stream is created by packetizing a voice element signal, and

wherein any stream containing information is not transmitted at the switching of streams by controlling the stream output means so that the transmission of the finish end of a voice encoding unit is completed prior to the stream switching while the start end of a next voice encoding unit is transmitted subsequent to the stream switching.

8. A signal transmission method according to claim 7, wherein the continuity of the Presentation Time Stamp (PTS) in the output stream is assured by synchronizing the voice encoding units prior to and subsequent to the stream switching across the stream output means.

9. A signal transmission method according to claim 7, wherein the stream output means is controlled so that the

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start end of a first voice encoding unit subsequent to the stream switching becomes the start end of a Packetized Elementary Stream (PES) tagged with a Presentation Time Stamp (PTS).

10. A signal transmission method according to claim 2, wherein said stream is created by packetizing an encoding signal relating to one of a picture element signal and a voice element signal, and

wherein any stream containing information is not transmitted at the switching of streams by controlling the stream output means so that the transmission of the finish end of the encoding unit of the encoding signal is completed prior to the stream switching while the start end of a next encoding unit is transmitted subsequent to the stream switching.

11. A signal transmission method according to claim 10, wherein the data encoding units are synchronized across the stream output means prior to and subsequent to the stream switching, thereby assuring the continuity of the Presentation Time Stamps in the output stream.

12. A signal transmission method according to claim 10, wherein the stream output means is controlled so that the

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start end of a first data encoding unit subsequent to the stream switching becomes the start end of a Packetized Elementary Stream (PES) packet tagged with a Presentation Time Stamp (PTS).

13. A signal transmission method according to claim 1, wherein said stream is created by packetizing information signal relating to service information.

14. A signal transmission method according to claim 1, wherein said stream is created by packetizing information signal relating to individual information about receiving means for receiving said output stream.

15. A signal transmission method according to claim 1, wherein said stream is created by packetizing a scrambled signal, and

wherein control information containing a scramble key is synchronized across said stream output means for streaming, and the continuity of the scramble key is assured subsequent to the stream switching.

16. A signal transmission method according to claim 1, wherein said stream output means is controlled so that the scramble key coincides with the scramble key of common

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information prior to and subsequent to the stream switching and so that the Program Specific Information (PSI) coincides with the Progress Clock Reference (PCR) in timing and period, and

wherein the transmission period of common information in the output stream is set to be a predetermined period.

17. A signal transmission method according to claim 1, wherein said stream is created by packetizing a signal having a Transmission and Multiplexing Configuration Control (TMCC) frame structure, and

wherein the TMCC frames are synchronized across the stream output means and the stream output means is controlled so that the transmission of the finish end of the TMCC frame is completed prior to the stream switching while the start end of a next TMCC frame is transmitted subsequent to the stream switching.

18. A signal transmission method according to claim 1, wherein when a discontinuity occurs in a continuity indicator in the output stream subsequent to the stream switching, the value of the continuity indicator subsequent to a discontinuity point is updated to be a value continued from the value immediately prior to the discontinuity point.

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19. A signal transmission apparatus comprising:

a plurality of stream output means which encodes and packetizes a signal in compliance the Moving Picture Experts Group (MPEG) Standard, multiplexes packetized signals, and then outputs the multiplexed signal in a stream;

a stream switching means which creates a single output stream by switching and concatenating streams output from said plurality of stream output means, thereby forming and outputting a single output stream;

a control means for controlling the operation of said plurality of stream output means and said stream switching means; and

a reference signal generator means for generating a reference signal serving as a reference for the operation performed by said plurality of stream output means and said stream switching means,

wherein said control means controls said plurality of stream output means, thereby synchronizing the System Time Clocks (STC) across said stream output means, assures the continuity of a Progress Clock Reference (PCR), a Presentation Time Stamp (PTS), and a Decoding Time Stamp (DTS) while not transmitting any stream having information when the streams are concatenated.

20. A signal transmission apparatus according to claim

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19, comprising as said plurality of stream output means:

7 a stream output means which outputs a stream by encoding, packetizing, and multiplexing signals of picture element data or voice element data on a real time basis;

a stream output means which outputs a stream by reproducing a prerecorded stream; and

a stream output means which outputs a stream by adjusting the timing of streams supplied from outside.

21. A signal transmission apparatus according to claim 19, comprising as said plurality of stream output means:

a stream output means which outputs a stream for displaying picture element data in a standard format; and

a stream output means which outputs a stream for displaying picture element data at a definition higher than that of said standard format.

22. A signal transmission apparatus according to claim 19, comprising:

a selector means which receives said signals from which the stream is formed by said plurality of stream output means, and selects, from among said signals, the signal used by one of said plurality of stream output means; and

a redundancy stream output means which outputs a stream using the signal selected by said selector means,

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wherein said stream output means supplies said control means with an operation monitoring signal indicating whether the generation of the stream is correctly in progress, and

wherein when said control means detects through the operation monitoring signal any stream output means which fails to create correctly the stream, said control means controls said selector means to supply said redundancy stream output means with the signal which was supplied to the stream output means that failed to create correctly the stream, and said control means controls said stream switching means to use the stream output from the redundancy stream output means rather said stream output means which failed to create correctly the stream.

23. A signal transmission apparatus according to claim 19, wherein said stream output means creates a stream which includes common information and individual information relating to Program Specific Information (PSI), service information, and entitlement reception information.

24. A signal transmission apparatus according to claim 19, wherein said stream output means creates a steam which includes a signal having a Transmission and Multiplexing Configuration Control (TMCC) structure.

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25. A transport stream generation system for generating a single output transport stream by switching a plurality of transport streams, comprising:

an extractor means for extracting Program Clock Reference (PCR) information, Presentation Time Stamp (PTS) information, and Decoding Time Stamp (DTS) information contained in the plurality of transport streams;

a switching means for generating the single output transport stream by switching the plurality of transport streams; and

a control means for controlling said switching means referencing the PCR information, the PTS information, and the DTS information extracted by said extractor means,

wherein said control means controls said switching means to assure continuity of the PCR information, the PTS information, and the DTS information contained in the output transport stream.

26. A transport stream generation system for generating a single output transport stream by switching a plurality of transport streams, comprising:

an extractor means for extracting Program Clock Reference (PCR) information, Presentation Time Stamp (PTS) information, and Decoding Time Stamp (DTS) information contained in the plurality of transport streams;

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a switching means for generating the single output transport stream by switching the plurality of transport streams on a per transport stream packet basis; and

a control means for controlling said switching means referencing the PCR information, the PTS information, and the DTS information extracted by said extractor means,

wherein there is arranged, within a predetermined period of time in the vicinity of a switching point of said switching means, a time gap during which a transport packet containing information relating to the plurality of transport streams is not output from said switching means, and said control means controls said switching means to switch the plurality of transport streams within the time gap.

27. A transport stream generation system for generating a single output transport stream by switching a plurality of transport streams, comprising:

an extractor means for extracting time information contained in the plurality of transport streams;

a switching means for generating the single output transport stream by switching the plurality of transport streams on a per transport stream packet basis; and

a control means for controlling said switching means referencing the time information extracted by said extractor

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means,

wherein there is arranged, within a predetermined period of time in the vicinity of a switching point of said switching means, a time gap during which a transport packet containing information relating to the plurality of transport streams is not output from said switching means, and said control means controls said switching means to switch the plurality of transport streams within the time gap.

28. A transport stream generation method for generating a single output transport stream by switching a plurality of transport streams, comprising:

the step of extracting time information contained in the plurality of transport streams;

the step of generating the output transport stream by performing a switching process in which the plurality of transport streams is switched at a switching point on a per transport stream packet basis referencing the time information; and

the step of controlling said switching process to switch the plurality of transport streams during a gap time, wherein there is arranged, within a predetermined period of time in the vicinity of the switching point, the time gap during which a transport packet containing information

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relating to the plurality of transport streams is not output
as the output transport stream.

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